

## *Equisetum*

***Equisetum* (horsetail, snake grass, puzzlegrass)** is the only living genus in Equisetaceae, a family of vascular plants that reproduce by spores rather than seeds. It is a living fossil. (an organism (such as a horseshoe crab or a ginkgo tree) that has remained essentially unchanged from earlier geologic times and whose close relatives are usually extinct). **or** (A living fossil is an extant taxon that closely resembles organisms otherwise known only from the fossil record).

### **Habit and Habitat of *Equisetum*:**

The plant body of *Equisetum* has an aerial part and an underground rhizome part (Fig.). The rhizome is perennial, horizontal, branched and creeping in nature. The aerial part is herbaceous and usually annual. Majority of the species are small with a size range in between 15 and 60 cm in height and 2.0 cm in diameter.

Some species grow up in higher heights [e.g., *E. giganteum* (13 m), *E. telmateia* (2 m); *E. ramosissimum* (4 m), though their stem are relatively thin (0.5-2.0 cm in diam.)] showing vine-like habit and climb over adjacent forest trees.

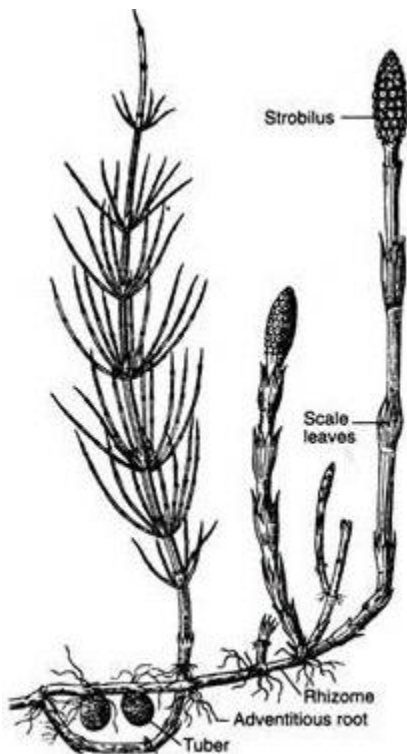


Fig. 7.83 : *Equisetum arvense* sporophyte

*Equisetums* generally grow in wet or damp habitats and are particularly common along the banks of streams or irrigation canals (*E. debile*, *E. palustre*). However, some species are adapted to xeric condition (e.g., *Equisetum arvense*). Some common Indian species are: *E. arvense*, *E.*

*debile*, *E. diffusum*, *E. ramosissimum*). Some species of Equisetum are indicators of the mineral content of the soil in which they grow. Some species accumulate gold (about 4.5 ounce per ton of dry wt.), thus they are considered as 'gold indicator plants.

Hence these plants help in exploration for new ore deposits. In Equisetum, silica is deposited on the outer wall of the epidermal cells giving the characteristic rough feeling, thus it provides a protective covering against predators and pathogens.

### **Structure of Equisetum:**

#### **The Sporophyte:**

The sporophytic plant body of Equisetum is differentiated into stem, roots and leaves (Fig. 7.83).

#### **Stem:**

The stem of Equisetum has two parts: perennial, underground, much-branched rhizome and an erect, usually annual aerial shoot. The branching is monopodial, shoots are differentiated into nodes and internodes.

In majority of the species, all the shoots are alike and chlorophyllous and some of them bear strobili at their apices (e.g., *E. ramosissimum*, *E. debile*). Sometimes shoot shows dimorphism (two types of shoots i.e., vegetative and fertile) e.g., *E. arvense*.

Some shoots are profusely branched, green (chlorophyllous) and purely vegetative. The others are fertile, unbranched, brownish in colour (achlorophyllous) and have terminal strobili.

The underground rhizome and the aerial axis appear to be articulated or jointed due to the presence of distinct nodes and internodes.

#### **Leaves:**

The leaves of Equisetum are small, simple, scale-like and isophyllous; they are attached at each node, united at least for a part of the length and thus form a sheath around the stem. The sheath has free and pointed teeth-like tips.

The number of leaves per node varies according to the species. The species with narrow stems have few leaves (e.g., 2-3 leaves in *E. scirpoides*) and those with thick stem have many leaves (e.g., up to 40 leaves in *E. schaffneri*).

The number of leaves at a node corresponds to the number of ridges on the internode below. The leaves do not perform any photosynthetic function and their main function is to provide protection to young buds at the node.

### Root:

The primary root is ephemeral. The slender adventitious roots arise endogenously at the nodes of the stems.

### Internal Features of Stem:

In T.S., the stem of *Equisetum* appears wavy in outline with ridges and furrows (Fig.). The epidermal cell walls are thick, cuticularised and have a deposition of siliceous material.

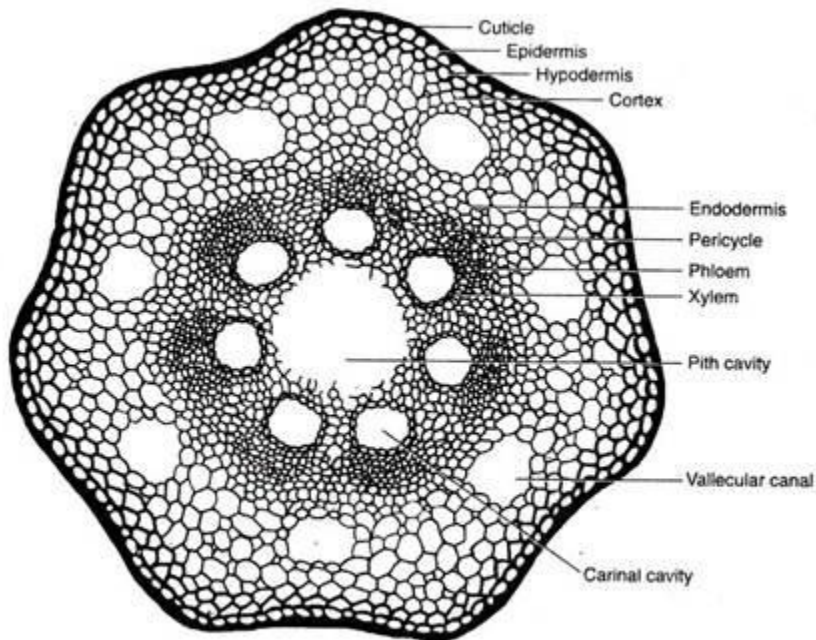


Fig. 7.84 : *Equisetum*, T.S. of stem (rhizome)

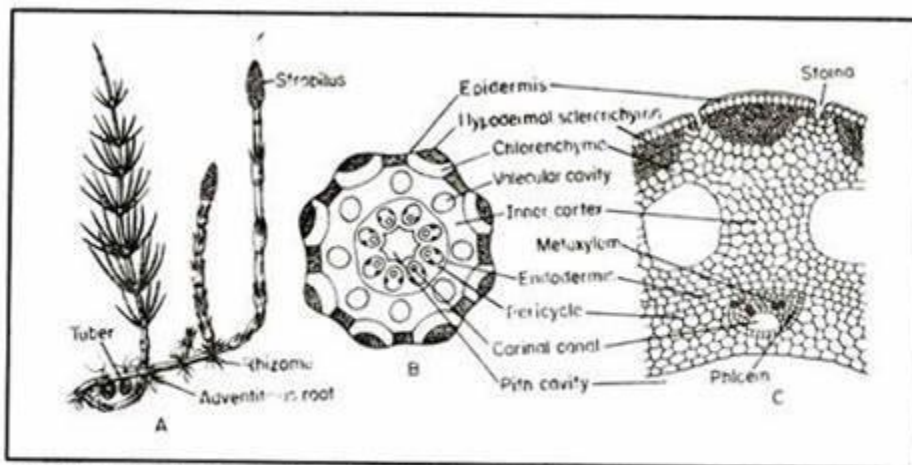


Fig 6.11. *Equisetum* Sp : A - Plant with both fertile and sterile branch, B - A.T.S. of stem (diagrammatic), C - T.S. of stem (a portion magnified).

Stomata are distributed only in the furrows between the ridges. A hypodermal sclerenchymatous zone is present below each ridge which may extend up to stele in *E. giganteum*. The cortex is differentiated into outer and inner regions.

The outer cortex is chlorenchymatous, while the inner cortex is made up of thin-walled parenchymatous cells. There is a large air cavity in the inner cortex corresponding to each furrow and alternating with the ridges, known as vallecular canal.

### T.S. Internode of Rhizome:

1. Ridges and grooves are not so much well-marked as in sterile shoot.
2. Absence of stomata (Fig.)

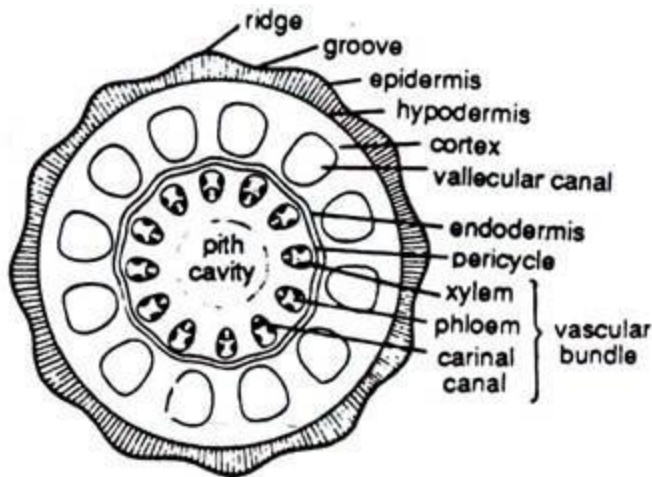


Fig. 240. *Equisetum*. T.S. internode of rhizome (diagrammatic).

3. Absence of chlorenchymatous region.
4. Sclerenchyma is poorly developed.
5. Hollow pith cavity is not well-developed and sometimes it becomes solid.

### T. S. Adventitious Root:

1. Outermost layer is epidermis, from which arise many root hairs.
2. Cortex is thick and multi-layered.
3. Outer zone of cortex consists of 3 to 4 celled thick exodermis.

4. Inner zone is parenchymatous with many intercellular spaces.

5. Endodermis is two-layered.

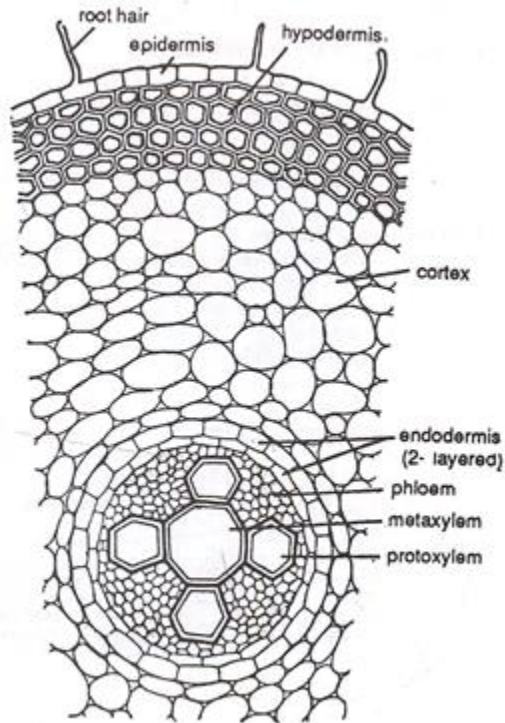


Fig. 242. *Equisetum*. T.S. root (a part cellular).

6. Pericycle is absent.

7. Stele is a protostele, which is triarch or tetrarch.

8. In the centre is present a large metaxylem tracheid having many protoxylem groups towards the periphery.

9. Phloem is present in between the angles of protoxylem.